

Title *Modeling and Simulation Resource Repository (MSRR)*
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QTEC, Inc. and Joe Hale, NASA MSFC

Abstract:

NASA's Exploration Systems Mission Directorate (ESMD) is implementing a management approach for modeling and simulation (M&S) that will provide decision-makers information on the model's fidelity, credibility, and quality, including the verification, validation and accreditation information. The NASA MSRR will be implemented leveraging M&S industry best practices.

This presentation will discuss the requirements that will enable NASA to capture and make available the "meta data" or "simulation biography" data associated with a model. The presentation will also describe the requirements that drive how NASA will collect and document relevant information for models or suites of models in order to facilitate use and reuse of relevant models and provide visibility across NASA organizations and the larger M&S community.



Integrated Modeling and Simulation-MSRR

MODELING AND SIMULATION RESOURCE REPOSITORY (MSRR)

(System Engineering/Integrated M&S Management Approach)

Audrey Milroy/QTEC
Joe Hale/NASA/MSFC

Pre-decisional DRAFT



Integrated Modeling and Simulation-MSRR

- Modeling and Simulation Resource Repository (MSRR)
 - **What is it?**
 - Community of Practice
 - ESMD/NASA
 - **Why is it needed?**
 - **Where is it?**
 - Community of Practice
 - ESMD/NASA
 - **How is it Used?**
 - Community of Practice
 - ESMD/NASA
 - **Way Forward**
 - ESMD Analysis of Alternatives



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WHAT IS IT?

- Basically a "Card Catalog" or "Simulation Biography" of accredited models/simulations/tools
- defined by Schema/subschemas for required/desired information/data
- contains the meta-data about a specific model/for an intended use

COMMUNITY OF PRACTICE IMPLEMENTATION

- DOD/DOE are largest users/providers of M&S
- DMSO, with the service components and agencies within DOD developed the DOD MSRR (1999)
 - distributed system
 - resource owners retain control of their own information
 - provides infrastructure services (security, authentication, search capabilities, web based, HELP Desk, User Registration, system administration)
 - designed originally for use by DOD members and contractors
 - flexible design structure where additional "nodes" can be established for other groups
 - URL: www.dmsso.msrr.mil



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- **WHAT IS IT? (Con't)**
- **NASA IMPLEMENTATION**
 - Early stages of formalizing ESMD M&S Management Policies
 - Establishing V&V processes and procedures
 - Accreditation processes and procedures
 - Determining “best approach/solution” to IM&S Data Base and an MSRR capability
 - Currently, no models have been through the processes
 - Currently, no collaborative or organizational methodology/mechanism in place to provide centralized or distributed visibility and access to data/information across multiple ESMD organizations/entities.
 - Limited visibility of models being used, across organizations and for specific VSE milestones
 - The MSRR is the end result of a system engineering effort to identify models that are used for critical decisions; process through the VV&A processes and populate an MSRR from a IM&S Data Base capability



Integrated Modeling and Simulation- MSRR

- [What's New](#) [Nodes](#) [Search](#) [Register](#) [Help](#)

[AIR FORCE](#)

[ARMY](#)

[NAVMSMO](#)

[MDA](#)

[C4ISR DSC](#)

[Defense Intelligence MSRR](#)

[DMSO](#)

[MEL](#)

[MSIAC](#)

[OMRC](#)

[Saved Searches](#)

[Search All Nodes](#)

[Search Wizard](#)

[Special Collections](#)

[MEL](#)

[Internet Search](#)

Resources:

[Add a Resource](#)

[Update a Resource](#)

[Assign Keywords](#)

[Nominate a Keyword](#)

[Protected Access](#)

[Metadata Access](#)

[Request Sponsor/POC Change](#)

[Request Org Change](#)

[Request Use History Change](#)

Groups:

[Add a Group](#)

[Update a Group](#)

[Assign Users to a Group](#)

[Help Desk](#)

[FAQs](#)

[Search FAQs](#)

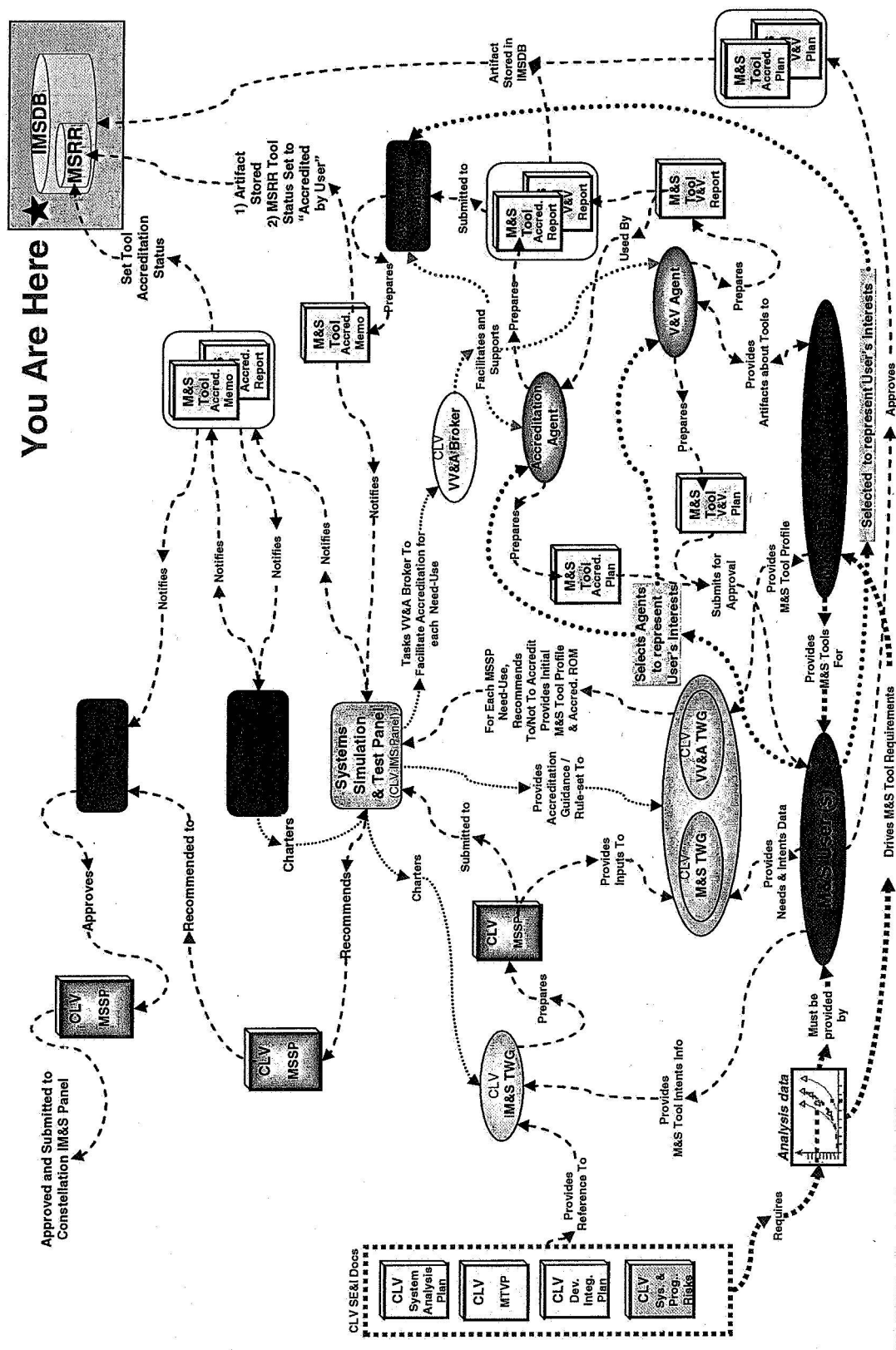
[User Information](#) [Forgot Password](#)

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BSM

Core Process Flow



CLV IM&S Core Process V1.0 060308 WRP

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- **WHY IS IT NEEDED AND WHEN?**
 - Models and simulations, analysis tools represent a significant effort and cost to organizations
 - The associated data related to the model represents an “enterprise asset” and need to be captured
 - Provides for reuse, cost effective traceability, accountability associated with technical decision-making processes
 - Basis for knowledge sharing and eventual cost reduction and eliminates duplicative work, etc.
 - Provides a framework to share resources (models, simulations, tools etc)
 - Facilitates reuse and interoperability of M&S
 - Needed when models, tools complete the VV&A processes and are “accredited” for a specific/intended use



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- WHERE IS IT?
 - M&S Community of Practice
 - Largest/most active "MSRR" is the DOD DMSO MSRR
 - » Centralized infrastructure functions are at DMSO Headquarters in Alexandria, VA
 - user registration & authentication
 - security, password etc
 - handles classified, unclassified, proprietary access
 - » DoD components and other nodes are distributed geographically but interconnected through the "WWW"
 - ESMD/NASA
 - » Not yet established
 - » Will result from the System Engineering Analysis of Alternatives that is currently in process



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HOW IS IT USED?

- used to transfer M&S information within and between “community of practice” and authorized users
- used to support the M&S community as a single integrated support activity for the use, employment and sustainment of M&S
- used to facilitate the use of scientific, technical and operational information relating to M&S in R&D, design, analysis, testing, evaluation, training, operations, maintenance of M&S
- used to develop products and services to increase productivity
- used to provide flexible cataloging and storage for M&S related resources
- used as a convenient way for users to search multiple networks for M&S resources which may be of use to them



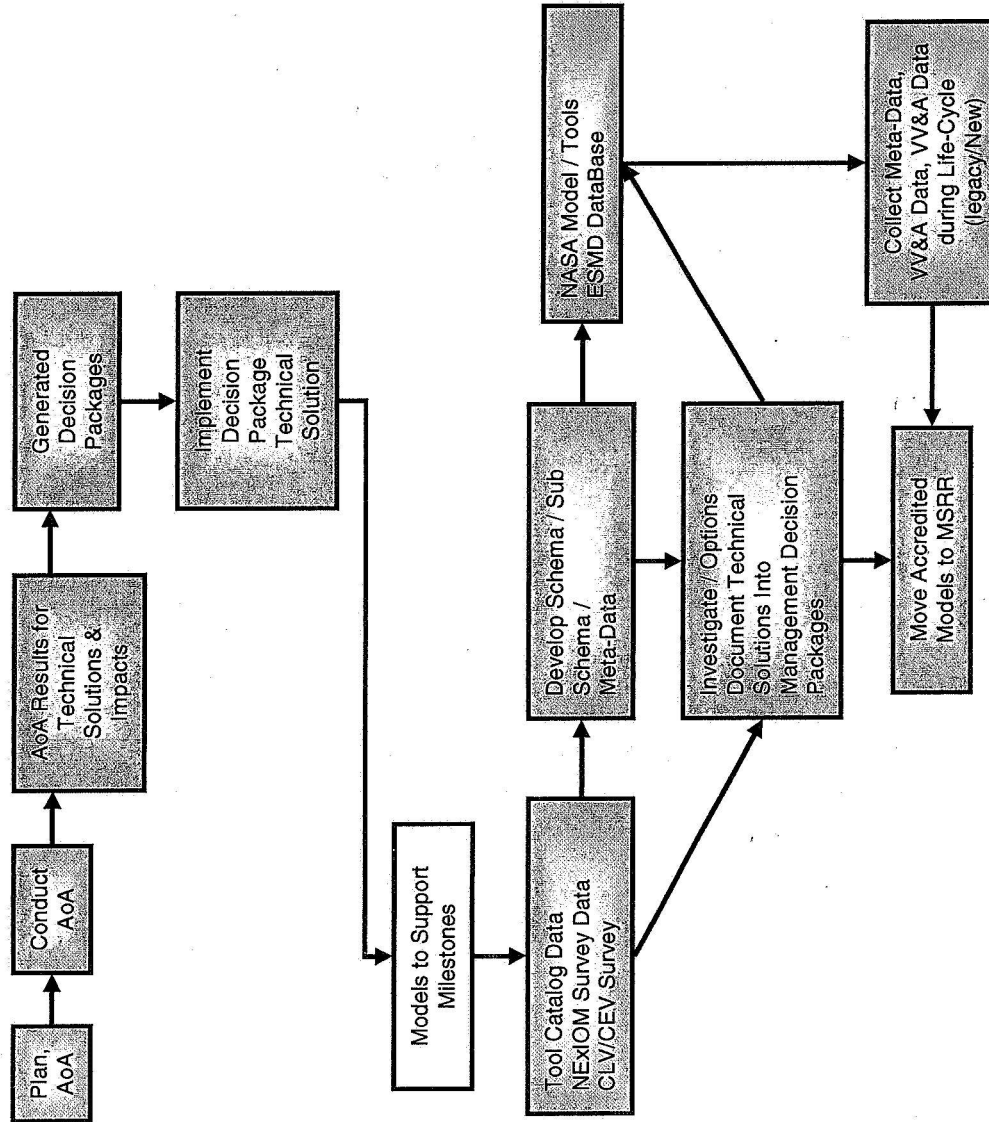
Integrated Modeling and Simulation-MSRR

- **ESMD/NASA WAY FORWARD**
- Maturing the M&S Management processes and VV&A processes
- Conducting a System Engineering Analysis of Alternatives (AoA)
 - Addresses the functions, processes needed to establish the end data product of an MSRR
 - MSRR is the end result of the VV&A process and the end data product of an Integrated Modeling and Simulation Data Base that contains the larger set of information for M&S
 - AoA to determine an informed basis of implementation for both the IM&S DB and the MSRR product:
 - Needs
 - Organizational & Operational Environment
 - Constraints
 - Definition of Alternatives
 - Trades to assessed
 - Operational Concepts for each Alternative
 - Quantifiable results of viable and non-viable alternatives
 - Cost analysis



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WAY FORWARD



System Engineering Functional View of Analyses of Alternative Approaches
IM&S Database and MSRR
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Integrated Modeling and Simulation

MSRR Backup Slides

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Distributed Collaborative Environment

ESMD staff at any level
Managers, Administrators, Specialists, Analysts, Engineers, Skilled Workers

IM&S Experts at Any Level
IM&S Technical Developers, Analysts, Experimenters, Testers, Engineers

Integrated Collaborative Work Env.
Collaborative Work

ESMD/IM&S DataBank
A coherent database related to the guidance, management, application, control, VV&A, and execution of all ESMD IM&S-related activities

IM&S Knowledge Base
KB Admin

Working Information
MSRR (Accessed IM&S)
IM&S Docs GUI
IM&S Working Papers GUI
IM&S Working Papers GUI
IM&S Working Papers GUI
IM&S Meta Data GUI

IM&S Users & Activities at All Levels
Managers, Boards, Teams, Agents, Developers, Analysts, Engineers
access to IM&S data & sources as authorized for activity & location
the aggregate collection of all information critical to the success of the ESMD IM&S lifecycle

MSRR Documents
IM&S Working papers
IM&S Working Data
IM&S MetaData

IM&S KB
User's Templates

Existing & Future IM&S Development Projects & Users across Levels, Projects, Applications, and IM&S Lifecycle
Needs → Rqts → Dev → Train → Distrib → Execution → Update
WG → Risk → VV&A → Training Certification

Common Processes for Temporal, Spatial, and Organizational Distribution of IM&S Lifecycle Activities

MSRR-IM&S DataBank
IM&S Knowledge Base
MSRR - VV&A

MSRR-VV&A User Group
VV&A Lead
VV&A Panel & WG Chairs
VV&A Brokers
VV&A Certification Agents
M&S WG members
M&S Tool Users
M&S Tool Developers

Queries & Data Entry
Data & Reports

IM&S Users, Developers
SE&I
T&V
SM&A
Contractors
Academia
Designers
Technologists

M&S Mgmt & Work Teams
M&S Panels and WGs
Management, Steering, Guidance, Control
Technical, VV&A, - Risk

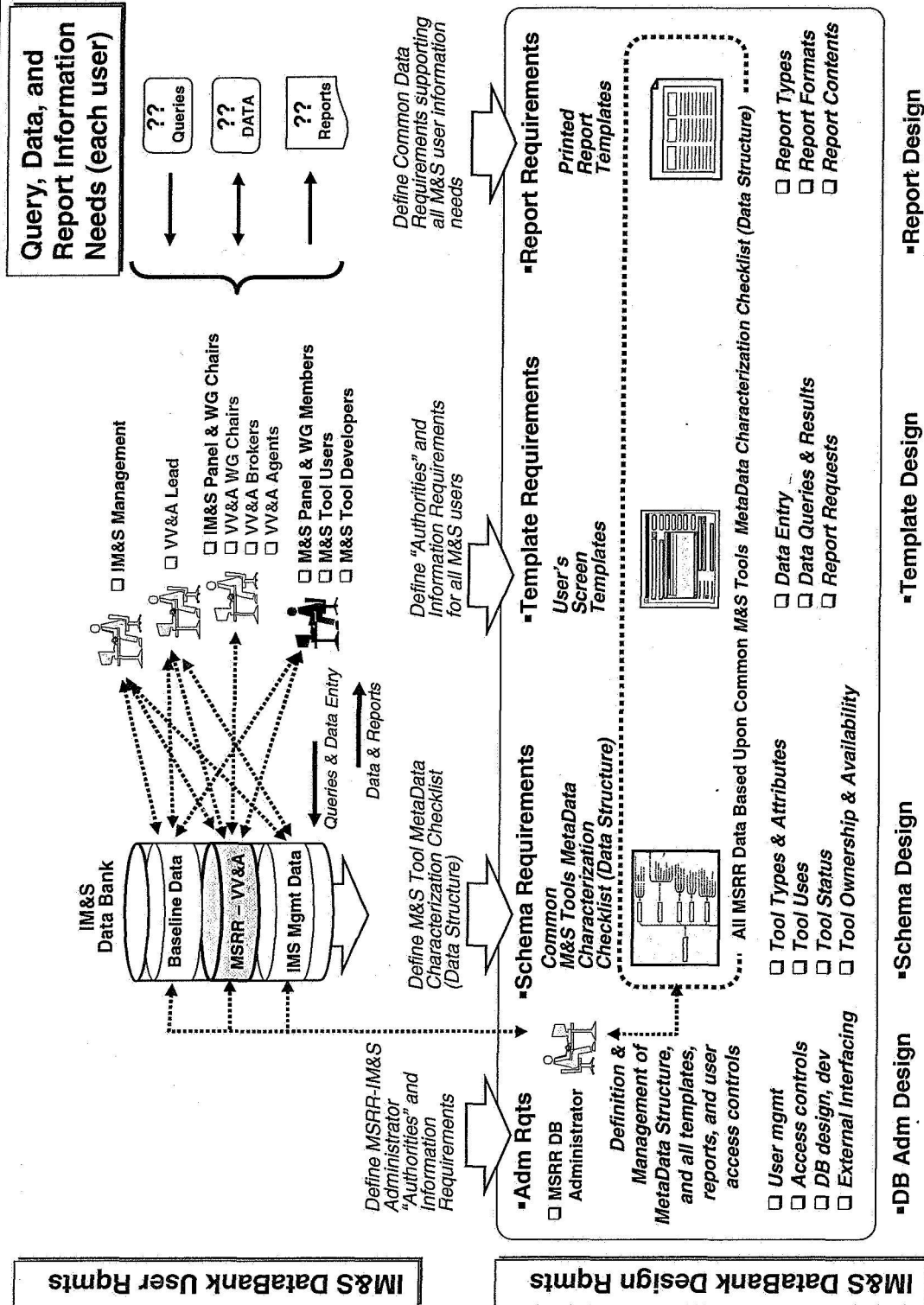
Distributed Users & Teaming

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Establishing MSRR-IM&S DataBank Requirements

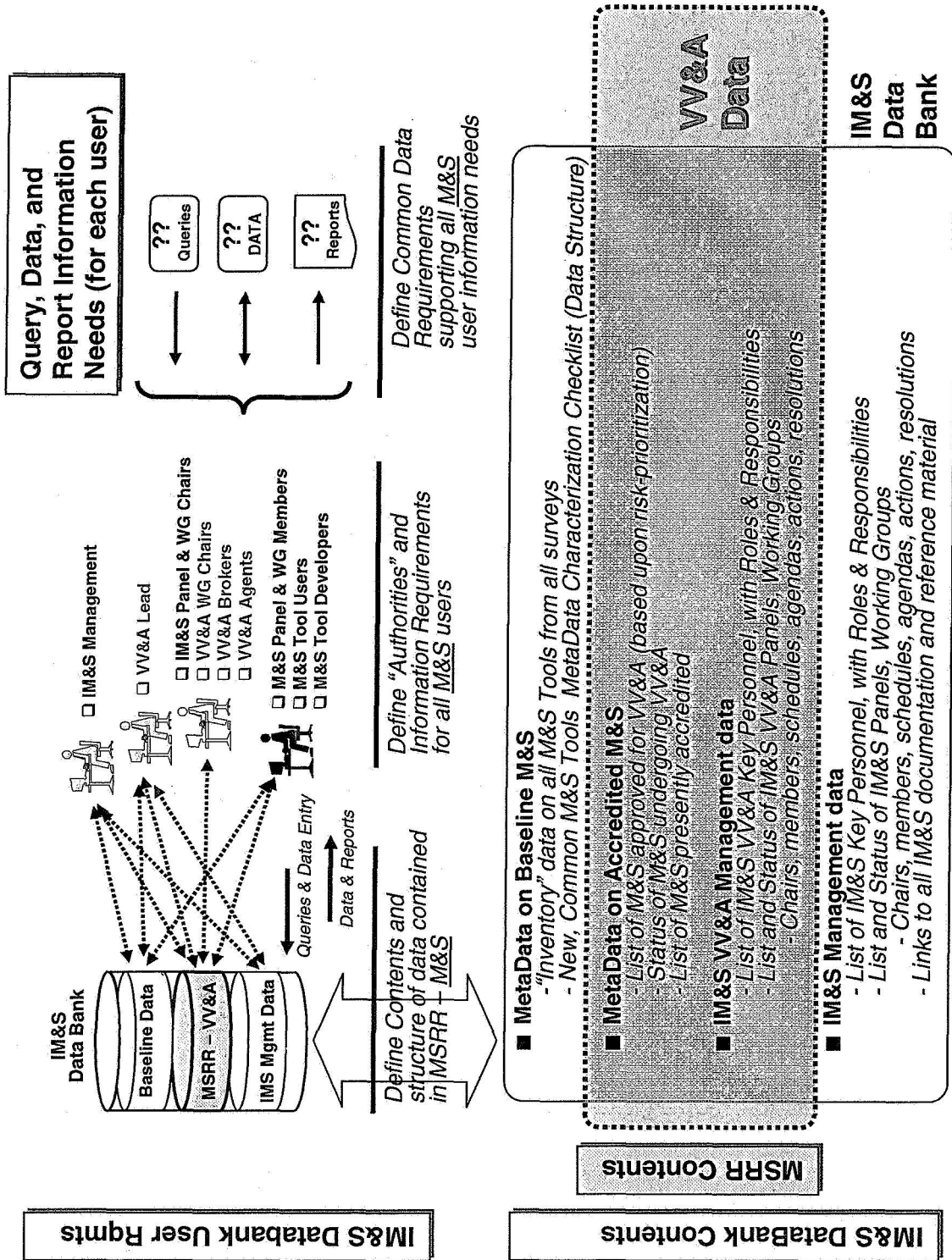


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IM&S DataBank (IMSDB) – IM&S Requirements Overview

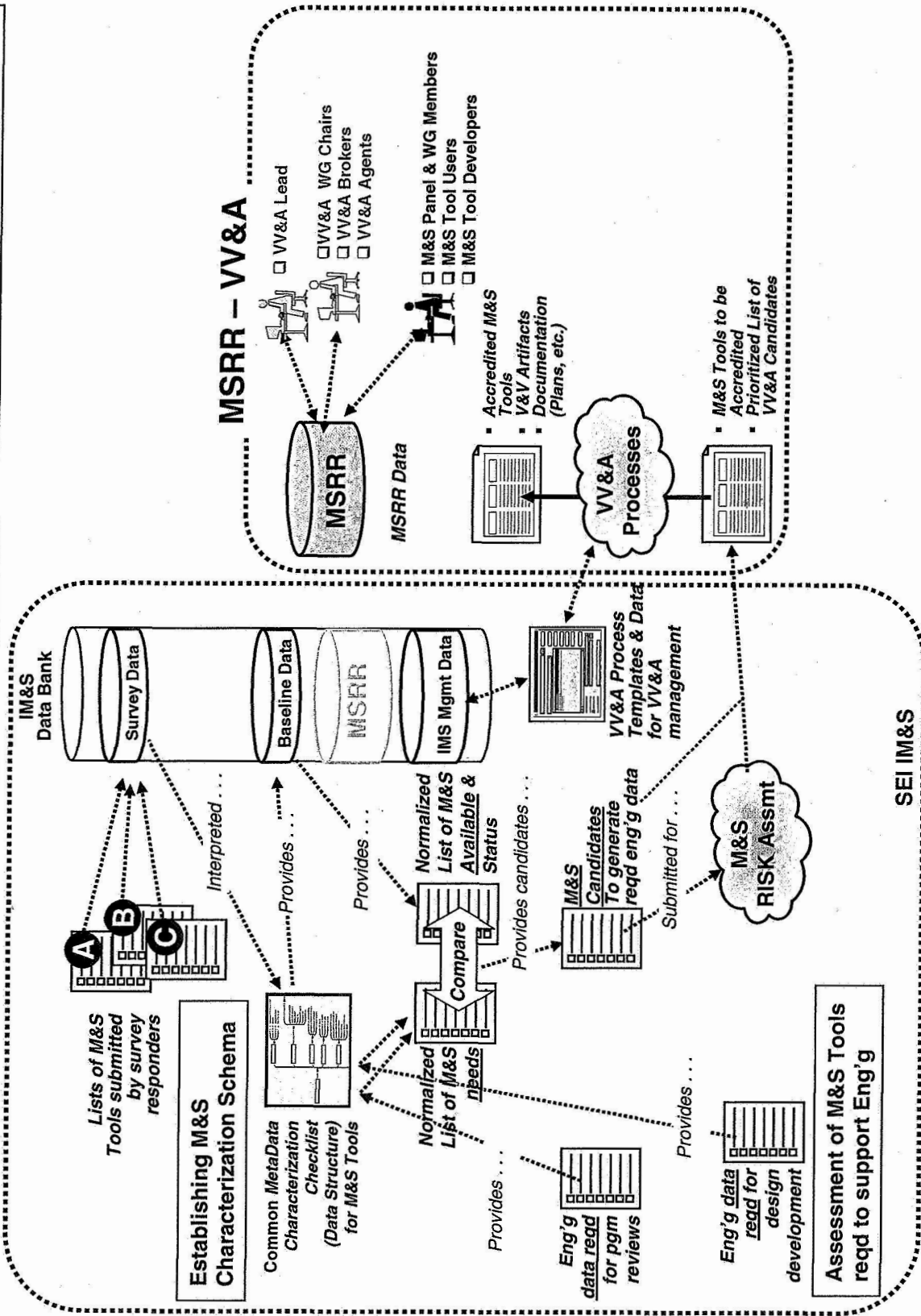


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Path to IM&S DataBank Requirements is thru IM&S/SE&I Collaborative Work



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MSRR (& IM&S Data Bank) Requirements

Infrastructure

- Web-based
- Search Capabilities
- Specialized Report Generation
- Accessibility by internal/external users
- User Authorization
- User Password protection
- Proprietary Data processes
- Not restricted by specific tool license or intensive training-needs to be intuitive with basic on-line instructions



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MSRR (&IM&S DB) Requirements

MSRR Capability Requirements/Objectives

- Develop & maintain methods for collection, analysis and dissemination of M&S related data
- Transfer M&S information within NASA
- Facilitate reuse and interoperability of M&S through common technical framework
- Provide data/information/products to increase productivity through accessibility to valid and current data
- Real time access



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MSRR Schema Data Initial Draft

Model Support Data Form

- Title:
- Type:
- Acronym:
- Purpose for which Developed:
- Other Applications for which it is Suitable:
- Date Developed/Implemented:
- HLA Compliance:
- HLA Certification:
- HLA Remarks:
- V&V Date(s):
- Accreditation Date(s)/Accredited for:

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MSRR SCHEMA DATA Initial Draft

- Security Classification:
- Security Caveat(s):
- Domain:
- Current Version:
- URL:
- Operating Environment
 - Hardware Requirements:
 - Software Requirements:
 - Licenses Required:
- How to Obtain:

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MSRR SCHEMA DATA Initial Draft

- Links to Related Documents
 - Short Title:
 - URL:
 - Description:
- Use Cases
 - Using Organization(s):
 - User Experience/Evaluation:
- Keywords:

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MSRR SCHEMA DATA

Initial Draft

- Sponsoring Organization/Owner/Center:
 - Name:
 - Acronym:
 - Address:
 - City: State: Zip:
 - Phone:

- Sponsor POC:
 - Name:
 - Title/Rank:
 - Address:
 - City: State: Zip:
 - Phone:
 - E-mail:



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MSRR SCHEMA DATA Initial Draft

- Technical POC: (same information as Sponsor POC)
- Accessible/Releasable to:
- User Fees:
- Producing Organization/Company:
- Producer POC: (same information as Sponsor POC)
- Will Producer Provide Tech Assistance During Installation?
- Will Producer Provide Tech Assistance After Installation?
- Operator Training Time and Cost:
- Current Users: (include user SME POC information, Department / Division / Office/Center, what used for, and lessons learned / successful practices)

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MSRR SCHEMA DATA Initial Draft

- **Databases:**
 - Required:
 - Time to Develop:
 - Where Maintained:
 - Reusable:
 - What Databases are Available:
- **Recurring Costs:**
- **Input/Output Format:**
- **Human Participation Required:**
- **Cycle Time:**
- **Comments**